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Detection of High Velocity Absorption Components in the He I lines of eta Carinae near the time of Periastron

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We have obtained a total of 58 high spectral resolution (R~90,000) spectra of the massive binary star eta Carinae since 2012 in an effort to continue our orbital and long-term echelle monitoring of this extreme binary (Richardson et al. 2010, AJ, 139, 1534) with the CHIRON spectrograph on the CTIO 1.5 m telescope (Tokovinin et al. 2013, PASP, 125, 1336) in the 4550-7500Å region. We have increased our monitoring efforts and observation frequency as the periastron event of 2014 has approached. We note that there were multiple epochs this year where we observe unusual absorption components in the P Cygni troughs of the He I triplet lines. In particular, we note high velocity absorption components related to the following epochs for the following lines:

He I 4713: HJD 2456754- 2456795 (velocity -450 to -560 km/s)

He I 5876: HJD 2456791- 2456819 (velocity -690 to -800 km/s)

He I 7065: HJD 2456791- 2456810 (velocity -665 to -730 km/s)

Figures: Note that red indicates a high-velocity component noted above.

He I 4713: <http://www.astro.umontreal.ca/~richardson/4713.png>

He I 5876: <http://www.astro.umontreal.ca/~richardson/5876.png>

He I 7065: <http://www.astro.umontreal.ca/~richardson/7065.png>

These absorptions are likely related to the wind-wind collision region and bow shock, as suggested by the high-velocity absorption observed by Groh et al. (2010, A&A, 519, 9) in the He I 10830Å transition. In these cases, we suspect that we look along an arm of the shock cone and that we will see a fast absorption change from the other collision region shortly after periastron. We suspect that this is related to the multiple-components of the He II 4686 line that was noted by Walter (ATel #6334), and is confirmed in our data. Further, high spectral resolution data are highly encouraged, especially for resolving powers greater than 50,000.

These observations were obtained with the CTIO 1.5 m telescope, operated by the SMARTS Consortium, and were obtained through both SMARTS and NOAO programs 2012A-0216, 2012B-0194, and 2013b-0328). We thank Emily MacPherson (Yale) for her efforts in scheduling the observations that we have and will obtain in the coming weeks.

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